

TOMATO LATE BLIGHT

W. H. Ridings and S. A. Alfieri, Jr.

Tomato late blight caused by the fungus *Phytophthora infestans* (Mont) DeBary can cause serious economic losses to the tomato transplant grower in Florida. This is especially important to the grower who must adhere to regulations against exporting transplants which show any symptoms of infection by *P. infestans*.

The late blight fungus was first described in 1846 and has been widely reported from every major continent of the world (8). Historically, the Irish potato famine of 1845 was caused by *P. infestans*. Tomato late blight was first reported in the United States from Connecticut in 1890 (7). The most recent serious losses to the tomato crop (*Lycopersicon esculentum* Mill.) in the United States occurred in 1946 when many eastern and southeastern states reported losses amounting to millions of dollars (1). In addition to the primary hosts of potato and tomato, *P. infestans* attacks eggplant, petunia, *Physalis* sp. and other solanaceous hosts (6,8).

SYMPTOMS. Foliage infection is evidenced by small to rather large dark green water-soaked lesions which usually begin at the margins or tips of the leaves (Fig. 1A). Under environmental conditions of high humidity and moderate temperatures, a white mildew consisting of fruiting bodies of the fungus may be noted on the lower surface of the leaves at the margin of diseased tissue. The leaf lesions usually enlarge rapidly



Fig. 1. Late blight of tomato: A) infection of leaves by *P. infestans* showing large water-soaked lesions; B) development of leaf infection into petiole and curling of leaves; C) naturally infected leaf which has become dry and curled; D) naturally infected tomato leaflet under a low incidence of late blight.

and become brown and paper-like (Fig. 1C). Stem and petiole infections are characterized by brown, water-soaked areas which girdle the stem or petiole (Fig. 1B). However, it is not uncommon under a low incidence of late blight to miss the early detection of symptoms (Fig. 1D).

DISEASE DEVELOPMENT. Temperature and relative humidity are the critical factors which determine the development of late blight. Spores (sporangia) are produced at a relative humidity of 91 to 100% (optimum at 100%) and at a temperature of 37 to 79 F (optimum at 64 to 68 F). Sporangia form in 8 hrs and are abundant in 14 hrs under the above optimal conditions. At a temperature above 68 F, sporangia lose their viability very rapidly (1 to 3 hrs) in dry air (20 to 40% RH) and fairly rapidly (5 to 18 hrs) in moist air (50 to 80% RH) (4).

The spores are readily disseminated by air to the foliage (8). A film of water is necessary continuously from the time of spore germination to infection. Germination and infection may occur by either of two methods or both, depending upon the temperature. At 37 to 70 F (optimum 54 F for 2 to 3 hrs) the sporangium may liberate numerous zoospores (swim spores) which germinate (optimum 54 to 59 F) and penetrate (optimum 70 F) the host in 2 to 8 hrs. At 68 to 82 F (optimum 75 F), the sporangium germinates directly and penetrates the host in 4 to 48 hrs. Thus, at low temperatures and 100% humidity, considerably greater spore (primarily zoospores) production and consequent infection occur. The development of infection following penetration is favored at a temperature of 70 to 75 F. Leaf lesions usually appear in 4 to 6 days following sporangium or zoospore germination (4).

The first seasonal spore inoculum may originate from overwintered infected tomato stems, fruits, or potato tubers left near or on the soil surface (2). However, due to variability in pathogenicity within *P. infestans*, the race which attacks potato may not necessarily attack tomato or vice versa (9).

CONTROL. Control of late blight is best accomplished in Florida with the use of protective fungicides (3,5). Any one of the following is suggested for use on tomato transplants: Bravo 75 WP (1½ to 2 lb/100 gal); Difolatan 4 flowable (2½ pints/100 gal); Dithane M-45 80 WP (1½ lb/100 gal); maneb 80 WP (1½ lb/100 gal); Manzate 200 (1½ lb/100 gal); or Polyram 80 WP (1½ to 2 lb/100 gal). Spray applications should be started when the first true leaves appear and continued on a 5 to 7 day schedule. Where conditions are favorable for blight, it is suggested that these fungicides be applied every 4 to 5 days.

Literature Cited

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